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in two volumes, "Realistic Idealism in Philosophy Itself," and another work entitled "Philosophy of the Universe." In 1889 he delivered the address at the 150th anniversary of the settlement of Peterborough.

The life of Judge Holmes in Cambridge for the last eighteen years was a very retired one, but it was neither solitary nor unhappy. He was a bachelor, but always had some relatives in his household, and never failed to find adequate companionship in his books. A great reader on a great variety of subjects, with a tenacious memory, he was full of knowledge of all sorts, and was a very interesting talker. Judge Holmes was a man of great candor and of remarkable equanimity. He had had successes and disappointments, but he was neither unduly elated by the one nor depressed by the other.

Judge Holmes was elected Fellow of the Academy May 24, 1870. Having removed from the State, he was elected Associate Fellow May 30, 1876. Having returned to Cambridge, his name was restored to the list of Resident Fellows November 30, 1889.

JEREMIAH SMITH.

SILAS WHITCOMB HOLMAN.

SILAS WHITCOMB HOLMAN was born at Harvard, Massachusetts, January 20, 1856, and graduated from the Massachusetts Institute of Technology in 1876, having made a specialty of the study of physics throughout his course. He was thereupon appointed to a position as assistant in the physical laboratory of that institution, but on account of illness did not enter upon his duties until a year later. Continuing in the service of the Institute, he was promoted to more advanced positions, and was made Professor of Physics in 1893. Even at this date his health, never firm, had become much impaired, and a few years later it became necessary for him to relinquish active work. In 1897 he was made Emeritus Professor of Physics. He died April 1, 1900.

Professor Holman was elected to membership in this Academy March 14, 1883. His original contributions to science were of high merit, and give evidence both of great skill in manipulation and of remarkably clear insight into the choice of methods for conducting a difficult investigation.

The most important of his researches are those upon the viscosity of air and carbonic acid as affected by temperature, which were published in the Proceedings of this Academy in 1876 and 1885; the first of which was based upon his graduating thesis at the Institute of Technology. These contain by far the most complete study of this difficult subject which had been made up to their date, and the results are still of standard value. Indeed within the past few years they have played an important part in the advancement of the kinetic theory of gases.

In the Proceedings for 1888 is found a further noteworthy paper written in conjunction with one of his pupils, upon the determination of fixed reference points for thermometric measurements at high temperatures, in which several such points are established.

A number of years later, in 1895, appeared another group of papers, the last published by him, relating to the thermo-electric measurement of high temperatures, and a single paper upon calorimetry, which subjects had occupied much of his attention for some time previously. Of these, the one entitled " Thermo-electric Interpolation Formulæ " is particularly valuable for its critique of the various methods of interpolation which have been employed in dealing with the results of high temperature observations, and that upon the "Melting Points of Aluminium, Silver, Gold, Copper, and Platinum," published in collaboration with his pupils, Lawrence and Barr, contains what are undoubtedly the best measurements of the points of fusion of these metals that had been obtained at the time of their publication. A third paper contains a description of a novel method of calibrating the Le Chatelier thermo-electric pyrometer, and the fourth a new method of applying the cooling correction in measurements of the heat of combustion.

The papers of Professor Holman thus far referred to have all been published in the Proceedings of this Academy. Several others of minor importance have appeared in different scientific journals. An extended critique upon thermometry of precision presented at the Boston meeting of the American Association of the Advancement of Science in 1880 unfortunately was never printed.

Besides his published researches, Professor Holman was the author of several valuable scientific works. The two volumes of " Physical Laboratory Notes," prepared for the use of his pupils in the Massachusetts Institute of Technology, embody the results of many years of successful experience in teaching and form an important contribution to the literature of that subject. They contain much original matter and exhibit a rare discrimination in the selection and comparison of the methods of measurement which are discussed. This is particularly the case with the volume relating to electrical measurement and testing.

In 1892 he published a treatise upon " The Discussion of the Precision of Measurements," the basis of which consisted of the notes of lectures given to his classes. This volume, which is quite unique in its contents, contains in convenient form a very compendious and lucid consideration of the application of the principles of least squares to the theory of observations, the calculation of their precision and the choice of proportions in designing physical apparatus to be used for measurement. Its value as a text-book has been very great.

The collection of four and five place logarithmic tables prepared in 1896 embodies several features of marked originality, and is prefaced by a brief but exceedingly useful discussion of the fundamental principles of computation which contains many useful suggestions for the economizing of labor.

The last work written by Professor Holman, entitled "Matter, Energy, Force, and Work," appeared in 1898, and is of a character widely different from any of those which preceded it. It is a philosophical study of the fundamental concepts of modern physics in which the subject is approached from the point of view that matter and energy rather than matter and force are the primary entities with which physics has to deal, and that matter itself may be dependent upon energy for its own existence. While not technical in its character, and intended especially for the help of teachers not wholly familiar with modern views, it is distinguished throughout by great clearness, and is a remarkable presentation of the newer modes of viewing the subjects which it considers.

Valuable as are his scientific publications, however, Professor Holman's great work was that of a teacher of young men in the laboratory. From the beginning of his service as an assistant in the Rogers Laboratory of Physics, his influence was marked, and by his patient labors, extending through years, he brought the work which was under his charge to a high state of development. He possessed great skill in the planning of apparatus and methods, and rare judgment as to the processes best suited either for purposes of instruction or for the securing of accurate scientific results. To the development of the Laboratory of Electrical Measurements in the Massachusetts Institute of Technology, he gave for years his best endeavors, and to him is due the success of its work. He was also placed in charge of the newly-instituted Laboratory of Heat Measurements, and though prevented by failing health from developing this as he would have chosen, he laid a solid foundation for those coming after him.

Professor Holman was born a teacher, and never grew weary in his profession. His personal relations with his pupils were very intimate. By that example which is better than the wisest precept, he impressed upon them the pre-eminent necessity of thoroughness, accuracy, and honesty in all work which they might be called upon to perform either as students or in professional life. He is remembered by them with the most affectionate regard.

Reference has already been made to the interference of ill-health with the prosecution of the labors of Professor Holman. In fact, after reaching manhood he was never in good health, and during almost the whole of his active life as a teacher he struggled with a painful chronic disease, which gradually, though with some intermissions, sapped his strength. His cheerful disposition and persistence in carrying on his work were such that none but those who knew him well were aware of the fact that it was only his indomitable courage which prevented him from yielding to his malady for some years before it finally overcame him. In the spring of 1890 he was obliged to discontinue work for a time. He spent the following year abroad, and came home much improved in health, but the relief was only temporary. In 1895 he finally gave up his work of instruction. For some years after this, however, though confined to his chair, and at last even deprived of sight, he continued to labor diligently, and published the tables of logarithms and the work on Matter and Energy mentioned above. His mind was clear to the last, and his cheerfulness never forsook him. His latest years were his best ones, and his whole life was a fine illustration of the manner in which a noble spirit may rise superior to circumstances and produce the best results under conditions to which an ordinary mind would utterly succumb.

CHAS. R. CROSS.

SYLVESTER R. KOEHLER.

SYLVESTER R. KOEHLER was born in Leipsic in 1837. He came to America at the age of twelve years. Son of an artist, grandson of a musician, he was destined by inheritance to an artistic career. Its bent was determined by his moving to Boston in 1868 and entering the establishment of L. Prang & Co. as technical manager. This position, after ten years, was given up, that he might devote himself exclusively to his art studies. With Charles C. Perkins and William C. Prime as associate editors, he launched the "Art Review," the most dignified and scholarly periodical devoted to art that has been published in the United States. It was aimed, to quote the preface, "to dwell upon the larger, more robust, more serious features of modern art," but it was in advance of its time, — the circle to which it appealed was small, and when after